

Name: _____

Date: _____ HR: _____

Topic 2.3 Internal Forces within Structures

Compression

Definition:

Example (diagram with an explanation)

Tension

Definition:

Example (diagram with an explanation)

Shear

Definition:

Example (diagram with an explanation)

Activity: Examining Forces

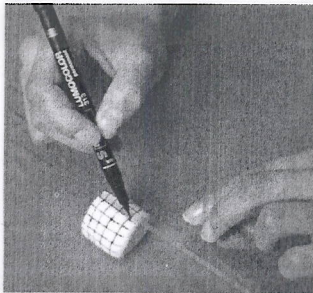
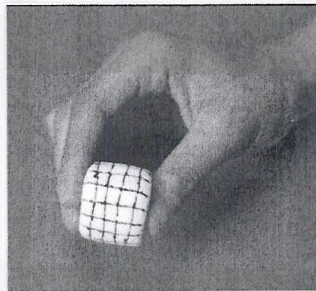
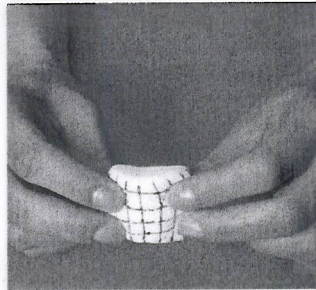
If you know the types of internal forces that stress part of a structure, you can design that part with the strength it needs to resist the forces acting on it. In this investigation, you will identify the forces acting on a variety of structures and materials and the effect each force has.

Stressed Out Marshmallows

Materials

- black non-permanent overhead felt pen
- 30 cm ruler
- 5 large-sized marshmallows

Procedure

1. As shown in the photograph, use a felt pen to draw a grid on 5 marshmallows. Use a ruler to draw the lines as straight as possible. The squares formed by the grid you should have sides of equal length. (Do not draw rectangles.)
2. Hold the marshmallow between two fingers as shown in the photograph. Squeeze the marshmallow. Observe changes to the horizontal and vertical lines. In the appropriate section of your data table, draw a diagram that represents the change in size and shape of the grid. Describe the changes to the grid lines using words such as "shortened," "lengthen," or "stayed the same."
3. As shown in the photograph, hold the second marshmallow firmly at both ends. Pull outwards. Record your observations as you did in step 2.
4. Holding a marshmallow with your hands positioned as they were for step 3, bend the ends of the marshmallows upward. Observe and record any changes to the grid on your data table.
5. While holding one end of a marshmallow on the edge of a desk or table, push the other end downward over the edge of the desk. Record your observations.

6. Firmly grip a marshmallow on each end as you did in step 3. By turning your hands in opposite directions, apply a twisting force to the marshmallow. Record your observations.

Observations-Force Versus Action

Action	Grid Diagram	Description of grid changes	Type of force(s) observed
Squishing			
Stretching			
Bending both ends			
Bending one end			
Twisting			

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Building Big-Interactive Engineering Lab

Website: <http://www.pbs.org/wgbh/buildingbig/>

1. Click on "**The Labs**" (Interactive engineering labs) and answer the following questions.
2. Try not to spend too much time in any one area.
3. Read the instructions carefully.

A. Forces Lab

What is another name for these forces? What is a real life example of these forces?

Squeezing Force:

Another name: _____ Example: _____

Stretching Force:

Another name: _____ Example: _____

Bending Force:

Another name: _____ Example: _____

Sliding Force:

Another name: _____ Example: _____

Twisting Force:

Another name: _____ Example: _____

B. Loads Lab

Complete the following chart.

Load	What does this load do to the structure?	How can you strengthen the structure?
Dead Load		
Live Load		
Soft Soil		
Earthquake		
Temperature		
Wind		
Vibration		